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ABSTRACT

In an effort to develop a more uniform and comprehensive system of national skill standards, the U.S. Departments of Education and Labor have awarded grants to 22 technical committees, composed of representatives from business, labor, and education, in a variety of industries and occupations. These projects will begin proposing national standards and certification for competencies. This report consists of a profile of each of these 22 projects based on their response to the following sets of questions: (1) What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?; (2) What definition of a standard are you using for your project? What is an example of such a standard?; and (3) How will performance against the standards be assessed? Each of the 22 profiles consists of one-page answers to these questions; the address, telephone number, contact, and date project began are also included. The 22 projects are in the following occupational areas: advanced manufacturing; agriscience and biotechnology; heating, air conditioning, and refrigeration occupations; automotive, auto body, and truck technicians; bioscience industry; computer-aided drafting and design; chemical process industries; electrical construction; electronics (both Labor and Education funded projects); food marketing industry; hazardous materials management technician; health science and technology; heavy highway and utility construction and environmental remediation; hospitality and tourism; human services; industrial launderers; metalworking; photonics technician; printing; retail trade; and welding occupations. (KC)

ED 369 994

National Center for Research in
Vocational Education

University of California, Berkeley

PROFILES OF THE NATIONAL INDUSTRY SKILLS STANDARDS PROJECTS

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

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Profiles of the National Industry Skills Standards Projects

Compiled by
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Introduction

The idea of identifying and specifying skill standards and credentialing requirements is not a new one in the United States. This process is used in a wide array of occupational systems operated by state governments, private industry, and professional associations. All states set licensing and certification standards for selected occupations such as real estate brokers and barbers. National trade associations such as the American Society of Quality Control and the National Automotive Dealers Association have also designed and operated occupational regulation systems. In addition, many unions, predominantly in the construction trades, have developed competency-based apprenticeship programs for many years. While these different systems are numerous, complex, and well-established in the United States, they do not constitute a coherent national system. Because few occupational credentialing systems are national in scope, their influence on entry or advancement in national labor markets is limited. Moreover, few systems have any formal links to mainstream secondary and postsecondary education institutions; consequently, they have little impact on curriculum or instruction.

In an effort to develop a more uniform and comprehensive system of national skill standards, the U.S. Departments of Education and Labor have awarded grants to twenty-two technical committees, composed of representatives from business, labor, and education, in a variety of industries and occupations. These projects range from eighteen months to three years and will begin proposing national standards and certification for competencies this year. Additional reports will be forthcoming through 1996. The projects that have been funded include the following:

- *Advanced Manufacturing*
- *Agriscience/Biotechnology*
- *Heating, Air-Conditioning, and Refrigeration Occupations*
- *Automotive, Auto Body, and Truck Technicians*
- *Bioscience Industry*
- *CADD (Computer-Aided Drafting and Design)*
- *Chemical Process Industries*
- *Electrical Construction*
- *Electronics (Department of Labor)*
- *Electronics (Department of Education)*
- *Food Marketing Industry*
- *Hazardous Materials Management Technician*
- *Health Science and Technology*
- *Heavy Highway/Utility Construction and Environmental Remediation*
- *Hospitality and Tourism*
- *Human Services*
- *Industrial Launderers*
- *Metalworking*
- *Photonics Technician*
- *Printing*
- *Retail Trade*
- *Welding Occupations*

In an effort to ascertain where these projects currently are in their thinking on issues related to the development and implementation of industry skill standards, the National Center for Research in Vocational Education (NCRVE) posed the following questions to the projects:

- *What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?*

- *What definition of a standard are you using for your project? Please give an example of a standard for your project.*

- *How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?*

This report consists of a "profile" of each of the projects based on their response to these questions. It is our hope that this compilation of profiles will be useful information for the twenty-two projects in comparing different development and implementation strategies and for state-level administrators in creating industry skill standards. These profiles represent only a snapshot of works in progress. However, we thought it would be useful to begin the dissemination process in order to invoke discussions about how these efforts will impact secondary and postsecondary curriculum and instruction.

We wish to thank the twenty-two industry skill standards projects for participating in this survey, for we recognize the difficulty in charting new waters and reporting mid-voyage. Developing industry skill standards and certification is in no way an easy task, and we applaud their efforts!

Catherine Gilbert provided valuable support in organizing and following up with the survey respondents. Andrea Livingston edited each profile with her usual dedication and commitment. Leslie Retallick designed the profile layout with her flare for knowing what looks best. All of their efforts were essential to the finished product.

Mikala L. Rahn

For more information on the National Industry Skills Standards Projects, see the following source:

Hoachlander, Gary, & Rahn, Mikala L. (1994, January). National Skills Standards: Everyone Agrees on the Destination. Getting There Is Another Story. *Vocational Education Journal*, 69(1), 20-22, 47.

FOUNDATION FOR INDUSTRIAL MODERNIZATION (FIM)
1331 Pennsylvania Avenue, NW
Suite 1410, North Tower
Washington, DC 20004-1703
Telephone (202) 662-8968/8965
Contact: C. J. Schroll, Director, or Sally O'Dowd, Deputy Director
Date Project Began: January 1994

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

Advanced manufacturing firms use computer-based technologies, teamwork, and communicatons that are integrated into a system capable of furnishing a mix of large and small projects, offering both the efficiency of mass production and the responsiveness of custom manufacturing. Such firms are also characterized by empowered workers responsible for making critical decisions affecting the manufacturing process, the use of Total Quality Management (TQM), Just-in-Time (JIT) inventory control, lean production, and agile manufacturing. As the primary customers of the process, advanced manufacturing firms will take the lead in establishing the basis for the skill standards.

Technical teams representing different occupations in advanced manufacturing will help the project develop standards for the various domains. These standards will be combined into a single format to reflect the core, cross-functional skills that all competent workers in advanced manufacturing should possess. Competent workers are described as having the requisite skills and knowledge to work in an advanced manufacturing environment and complete manufacturing processes.

The project focuses on a recurrent theme: Companies strive to improve production strategies and manufacturing processes to acquire a competitive edge, creating a context in which industry skill standards for advanced manufacturing should be developed. Team-based work environments are a major component of organizational change and dramatically affect the skills required of workers. Teamwork calls for workers with competent levels of reading, math, science, technical, social, and communication skills. In addition, all employees must keep one end in sight—customer satisfaction. *In sum, the project's skill standards will reflect current forms of work organization and will be flexible enough to accommodate workplace change.*

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A standard is the skill level a competent worker should achieve in core skills areas.

Standard: Read technical information and apply it to a manufacturing process.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Assessments will include performance-based and written tests, skill portfolios, and third-party evaluations.

NATIONAL FFA FOUNDATION
5632 Mt. Vernon Memorial Highway
Box 15160
Alexandria, VA 22309
Contact: Dr. Jeff Moss at
116 Sheringham
Normal, IL 61761
Telephone (309) 862-3837
Date Project Began: June 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

Skill standards are being developed for technicians who work in agriculture and related industries, who use the tools of biotechnology, and who have less than a baccalaureate degree. The technicians will have employment opportunities in the private and public sector of agricultural research working in (1) laboratories, in research and development, quality assurance, regulation, and quality control; (2) fields and/or greenhouses; and (3) animal facilities. The scope of the standards was established by an industry committee whose membership represented the diverse employment opportunities in the field of agricultural biotechnology.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

The performance skill standards include the technical, employability, and related academic skills that a person needs to be successful as a technician working in agricultural biotechnology. Necessary tools and equipment, hours of study, and qualifications of an instructor are also being determined through the joint efforts of education, industry, and labor.

An example of a standard:

Technical skill: Agricultural biotechnicians must be proficient in nucleic acid techniques, including the ability to determine specific DNA sequences.

Employability skill: Agricultural biotechnicians must be able to acquire and record information, including the ability to recognize unexpected results, document activities immediately, and forward information appropriately.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

An executive committee of industry, education, and labor collaborators considered assessment and certification options in March 1994. Their intention is to offer a voluntary certification program operated by the agricultural industry and/or student assessment through secondary and post-secondary schools.

V-TECS
1866 Southern Lane
Decatur, GA 30033-4097
Telephone (800) 248-7701
Contact: Victor Harville
Date Project Began: October 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The National Skill Standards Project for Heating, Air-Conditioning, and Refrigeration Occupations is organizing the heating, air-conditioning, and refrigeration industry by equipment capacities and the functional classification of technician duties. The capacities are classified as residential, light commercial, commercial, and industrial systems; the functional classifications are installation, maintenance, repair, and operations.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

For this project, skill standards are defined as the "technical skills, academic concepts, and workplace behaviors required for acceptable job performance."

An example of a skill standard would be:

> *A technician must demonstrate an understanding of the refrigeration cycle with reference to gas and thermodynamic laws.*

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Assessment tasks will be developed during Phase II of the project.

Automotive; Auto Body, and Truck Technicians

National Automotive Technicians Education Foundation (NATEF)
13505 Dulles Technology Drive
Herndon, VA 22071-3415
Telephone (703) 713-0100
Contact: Pat Lundquist
Date Project Began: October 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The definition of the automotive service industry, for the purposes of this grant, includes automobile, autobody, and medium/heavy truck technicians. The criteria that the project used for setting the boundaries of the industry included the vehicles that the technicians serviced and the tasks that they performed. The standards are set according to both the service areas and the tasks performed by technicians.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

NATEF administers the Automobile, Autobody, and Medium/Heavy Truck Technician Training Programs for the National Institute for Automotive Service Excellence (ASE). The standards evaluated by NATEF are *program* standards and reflect minimum requirements for automotive training programs. Each of the ten standards have subsections that are evaluated.

Standard 6—Instruction
Instruction must be systematic and reflect program goals. A task list and specific performance objectives with criterion-referenced measures must be used.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Programs must meet ten standards to achieve ASE certification, and they must complete a self-evaluation of their performance of the standards as well as have an on-site evaluation team evaluate the program. If a program meets the requirements for certification, it will achieve ASE certification.

Individual technicians wishing to be ASE certified technicians must have two years of employment in the automotive industry *and* must pass the ASE Certification Exam (given twice a year).

EDUCATION DEVELOPMENT CENTER (EDC)
55 Chapel Street
Newton, MA 02158
Telephone (617) 969-7100
Contact: Judith Leff
Date Project Began: October 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The Bioscience Industry is defined as an industry made up of pharmaceutical and biotechnology companies and a range of medical laboratories conducting research and diagnostic work.

The definition of the industry is based on the criteria that the entry-level work (in all three subsectors) share a common core of skill, knowledge, and attribute requirements, and that the workers perform a similar range of job tasks.

All laboratory-based entry-level occupations are being clustered into a *training occupation* called the Bioscience Technical Specialist I. The project is also developing a mid-level training occupation, the Bioscience Technical Specialist II. Moreover, the project has developed the concept of an *integrated skill standard*, which consists of a typical work-based, problem-based situation, accompanied by all the related tasks, skills, knowledge, and attributes. Performance criteria and assessment methods are also attached to each skill standard. A person must demonstrate mastery of a set of 30–35 (still not determined) skill standards to qualify for entry into the industry.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

The standard includes a situation (scenario); workplace setting for the situation; all tasks, skills, knowledge, and attributes required for solving and performing routine procedures related to the problem; performance criteria; and assessment methods.

Situation (Scenario) 2: *One part of your laboratory responsibilities is to unpack and process biological samples. While unpacking samples one morning, you notice that one of the samples is leaking from the container. What should you do? What tasks are the routine tasks necessary to perform these duties?*

Workplace setting for this situation:

√ A) Generic (Applies to B, C, and D)
B) Research and Development
C) Manufacturing
D) Clinical Laboratory

Key competency areas which this situation demonstrates:

Safety, tracking, documentation

EDUCATION DEVELOPMENT CENTER (EDC)
(continued)

Task mastery needed for solving the problem:

Duty G: *Observe and document safe practices*
- Task 2 Follow universal precautions for biological pathogens
- Task 3 Use protective equipment
- Task 7 Handle, contain, and dispose of hazardous materials

(Note: Duty area and tasks listed are incomplete due to space limitations.)

Task mastery needed for performing routine procedures:

Duty A: *Perform tests*
- Task 1 Obtain and read protocol, test procedure, SOP
- Task 2 Prepare and sample for testing
- Task 4 Determine acceptability and optimum conditions of reagents for tests

(Note: Duty area and tasks listed are incomplete due to space limitations.)

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

For each task, "indicators of mastery" and "indicators of failure to master" are provided. Assessment methods are also provided for each task. Among these methods are the following:

- Performance observation
- Written tests
- Portfolio and documentation assessment

People who demonstrate mastery of a percentage (yet to be determined) of all required situations (including the skills, knowledge, and attitudes) to a predetermined competency level will receive a certificate of technical mastery for Bioscience Tech Specialist I.

CADD (Computer-Aided Drafting and Design)

Foundation for Industrial Modernization (FIM)
1331 Pennsylvania Avenue, NW
Suite 1410, North Tower
Washington, DC 20004-1703
Telephone (202) 637-3436
Contact: Jane Beardsworth
Date the Project Began: October 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The project scope covers too many industries to mention in detail. Computer-Aided Drafting and Design (CADD) users can be found in many industries including the automotive, manufacturing, aerospace, construction, and a myriad of other. It is important to note that CADD itself is not an industry, but a tool that professionals can use to design or draw something.

Currently, the project can affect all industries—therefore, no boundaries have been set. All CADD users, regardless of what industry they work in, need the same basic skills to perform well on the job. The project attempted to define these core skills.

CADD is organized according to disciplines. A user may use CADD within any one of the following disciplines: Mechanical CADD, Electrical or Electronic CADD, Architectural Engineering Construction (AEC), Geographic Information Systems (GIS), Mapping, Plant Engineering, and so on. Once individuals have basic CADD skills, they generally gravitate toward a certain discipline depending on their area of interest and the profession they plan to enter. Eventually, however, they would also need to acquire the specialized skills that pertain only to that discipline.

Data for drawings are organized according to what discipline one is in. For example, architectural CADD users need to know different symbols than do electrical CADD users. An architect would put doors, windows, and appliances on a drawing, whereas an electrical CADD user would put switches, electrical outlets, and lights.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A skill standard as defined by coalition members is a CADD technical skill.

An example of a skill standard for CADD, taken from the *Basic CADD Skills* section under *Manipulate*, is the following:

Technical skill: Plot drawing on media using correct layout and scale.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Performance against these standards will be assessed through a voluntary national testing and certification program, which our office will administer by setting up test sites across the country, delivering the test to these test sites, and scoring them. A person may register to take the test during the hours the closest test site is open. The first test should be ready by April 1995. These tests will be different each time and will not be specific to any one kind of CADD software. A profile of the person's skills will be provided to each test taker.

American Chemical Society
1155 16th Street, NW
Washington, DC 20006
Telephone (202) 872-8734
Contact: Kenneth Chapman
Date Project Began: June 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The Chemical Process Industry (CPI) includes those industries that use chemistry in value-added processes, including the petroleum, pharmaceutical, and similar industries. The project broadened the common definition for CPI to include employers whose activities involve the application of chemistry in substantial ways (e.g., environmental monitoring and hazardous materials storage site remediation). As a result of input from many different employers, the project has chosen to focus on two clusters—laboratory technicians and plant technical operators.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

At this time, the format for "standard" has not been finalized for the project. However, the project will address standards such as the knowledge, skills, and attributes employers expect new hire laboratory technicians and plant technical operators to possess when they begin an entry-level position. Standards will also include descriptive information appropriate for translation to curricula and to give guidance for educators.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

The CPI has no experience with certification for the personnel targeted for this effort. Assessment/certification issues will be addressed by the project through the collaborating organizations as well as through the project directly. Only limited discussions about this issue have been held to date; however, one collaborating organization has asked their attorney to work with the project to address legal issues that may pertain to assessment/certification programs that may be promoted.

Electrical Construction

National Electrical Contractors Association
3 Bethesda Metro Center, Suite 1100
Bethesda, MD 20814
Telephone (301) 657-3110
Contact: Charles Kelly
Date Project Began: December 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The Electrical Construction Skills Standards Project is using more or less traditional definitions of the electrical construction industry to establish its boundaries of the industry (e.g., as stated in Standard Industrial Classification #173, "Electrical Work . . . special trade contractors primarily engaged in electrical work at the site"). Broadly defined, the electrical construction industry encompasses the installation, maintenance, and repair of electrical and electronic systems to provide light, climate control, power, and communications. Workers within the industry are involved in the generation, transmission, distribution, and utilization of power from the power plant to the consumer. The electrical construction industry also includes communications systems, telephone, teledata, computer networking, and fiber optic links, as well as related emerging technologies. Workers and companies involved in electrical construction are at the forefront of electrical and electronic systems.

Occupations falling within the project's scope include the following: Inside (building construction), Outside (power line construction), and Residential electrical workers.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A standard is defined as the set of skills and knowledge required of an individual to successfully install electrical systems.

Within each appropriate category, the standards will define occupations relying on complete training and understanding of entire systems rather than on partial training for limited, task-specific functions.

The project is currently validating the knowledge, skills, and abilities (KSAs) developed for each of the three occupations, and has not yet drafted standards.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Performance assessment and certification systems have not yet been developed, but will likely mirror the traditional apprenticeship model, which serves as one of the fundamental sources for the project. Assessment in that system has been based on satisfactory classroom and on-the-job performance. Standard tests drawn from a nationally developed curriculum have been used to assess related classroom competency, while on-the-job skills have been assessed through observation by a "mentoring" qualified craftsperson at the journey level.

American Electronics Association
5201 Great America Parkway
Santa Clara, CA 95056
Telephone (408) 987-4200
Contact: Cheryl Fields Tyler
Date Project Began: December 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The membership categories of the American Electronics Association (AEA) are used to define "industry," but those categories are shifting as the industry changes and moves more into software, services, and telecommunications.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

Occupational standards tell us which are the critical functions in a given occupation and how to identify good on-the-job performance. (See the publication entitled "Setting the Standard: A Handbook on Skill Standards for the High-Tech Industry" published by the American Electronics Association.)

Standard Example:

Critical function: Assure production process meets business requirements.

Key activities (one example): Meet health, safety, and legal requirements with regard to process, product, and people.

Performance criteria: Health and safety requirements and procedures are implemented and followed at all times.

- Potential health and safety hazards are identified through continuous safety reviews.
- Confidentiality of proprietary information is protected according to company policy.
- Company standards of business conduct are followed.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Performance against occupational standards is most generally assessed in the workplace or, at a minimum, in "simulated" work environments. There may be some aspects of what we call "underlying skill, knowledge, and work readiness skills" that could or would be assessed in the context of education and organization (e.g., technical understanding such as Computer Aided References or a work reaction literacy level, and so on). Both will be incorporated into a Portfolio of Professional Competence that would enable an individual to assemble and renew credentials throughout a lifetime of learning.

ELECTRONICS INDUSTRIES FOUNDATION
919 18th Street
Washington, DC 20006
Telephone (202) 955-5814
Contact: Irwin Kaplan
Date Project Began: October 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The electronics industry is defined by membership in the Electronics Industry Association or being on the Association's mailing list. One occupational cluster that is currently being considered by the project is the Electronics Technician. The project has identified 11 specialty occupations that make up this cluster. The target is to develop skill standards for the entry-level electronics technician.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A skill standard is the knowledge, skills, and level of ability needed to perform a job satisfactorily. These standards may be specific to an occupation, cross occupational lines, or apply to groupings of occupations. The concept of skill standards can be tailored to any industry to reflect its particular needs and economic development.

An example of a standard:

- Demonstrate an understanding of acceptable soldering/desoldering techniques, including through-hole and surface mount devices.
- Demonstrate an understanding of the technical basis for the workings of a product/device circuit/procedure and be able to apply that knowledge.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

The project will define the criteria for successfully meeting the standards. Educators will be expected to use these criteria as their measurements of the students. A certification process will also be defined that may include assessment of graduates using tests and/or practical exercises, accreditation of training institutions, and/or practical work experience. The assessment certification system will be defined in Phase II of the project.

National Grocers Association
1925 Samuel Morse Drive
Reston, VA 22090
(703) 437-5300
Contact: James P. Williams
Date Project Began: October 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The food marketing industry consists of approximately 1.5 million establishments that employ more than 12 million people. Such establishments include gourmet food stores, convenience stores, and full-line supermarkets.

Because a needs analysis revealed that the highest rate of growth in the food marketing industry will be in the retail operations segment, the bakery, floral, dairy, delicatessen, grocery, produce, seafood, meat, and general merchandise departments were selected.

The project is organizing job functions in the food marketing industry into three occupational titles: stock clerk/production clerk, front end clerk, and customer service clerk. These generic occupational titles are found in each major retail department.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A standard includes the following elements:

- A performance objective, including a task statement, conditions, and standard
- Performance steps
- Enabling competencies—the knowledge and skills (cognitive, affective, and psychomotor) necessary for the performance of the task

Example:

Task statement: Resolve transaction errors.

Conditions for performance: cash register, form for recording errors on register, pen

Standard: Error must be adjusted so that the register tape will reflect the correct cost of purchase

Performance steps:

1. Determine incorrect amounts.
2. Void incorrect amount in cash register.
3. Notify supervisor of incorrect amount in cash register.
4. Key in/input correct amount.
5. Record error adjustment according to store policy.

National Grocers Association
(continued)

Example (continued):

Enabling competencies: Follow store policy; read to obtain information; and perform mathematical computations.

Related academic skills:

- Compute—addition of complex numbers, whole numbers, and decimals; subtraction of complex numbers, whole numbers, and decimals
- Comprehend—the sequence of written information

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

A credentialing exam consisting of both objective and performance elements will be developed.

CORD
601C Lake Air Drive
P.O. Box 21689
Waco, TX 76710
Telephone (817) 772-8756
Contact: Jim Johnson
Date Project Began: May 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

For this project, the term "industry" has been defined in two ways. The principal definition refers to potential employers (business, industries, or individuals) of Hazardous Materials Management Technicians (HAZMATs). A more general usage of the term refers to educators and individuals (in addition to potential employees) who have specific experience or knowledge related to the occupation.

At this stage in the project, no attempt has been made to limit the industry because one objective is to identify every possible employment opportunity for HAZMAT technicians.

The majority of the project's efforts so far have involved working with professional societies, government agencies, and other organizations that have contact with large numbers of professionals in this industry.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A standard is a "norm" recognized as authoritative by the majority of the industry. Standards are either regulatory (such as EPA and OSHA requirements in the HAZMAT industry), or they are voluntary. For the purposes of this project, we have chosen to use voluntary standards. To develop a voluntary standard, a document must be designed by a consensus of leading experts within the industry. Typical examples are the American National Standards Institute (ANSI) standards. Committees are formed by appointed chairpersons recognized as experts in their field. These committees are responsible for assembling and disseminating a document on their standards throughout the industry. The success of a standard depends upon the diversity and number of industry representatives involved in the process. For instance, excellent standards developed by relatively small professional organizations may not be recognized as having equal worth to standards developed and disseminated by larger, more diverse organizations.

Regulatory standards are very common in the HAZMAT industry, and are primarily enforced by the EPA, OSHA, and state agencies. Voluntary standards have been developed by various professional societies that certify individuals with specific competencies. For instance, the National Environmental Training Association (NETA) provides a certificate to individuals who have had the training and experience required to teach environmentally based short courses. These teachers become certified as a Certified Environmental Trainer (CET), which has become a prestigious credential. Other environmental organizations are involved with different certification programs, nearly all of which are for "professionals" in the field. Typically this requires a bachelor of science degree or higher and some occupational experience.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

The project (advisory committee) has not addressed this topic yet, but is currently looking for ideas.

Health Science and Technology

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Date the Project Began: October 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The National Health Science and Technology Standards Project is organizing the health care industry into four occupational clusters: **Diagnostic**, **Therapeutic**, **Information Systems**, and **Support**. Each cluster includes related occupations that fulfill similar functions. For example, the shared purpose for diagnostic workers is to produce an accurate picture of patient health at one point in time, whereas the goal for therapeutic workers is to change patient health status over time. In addition to standards directed at each occupational cluster, the project is also developing standards for a health care core (that is, broad standards that apply to all health care workers).

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A standard is defined as a broad statement describing the content a student or worker must master and the performance necessary to demonstrate mastery. Each standard statement consists of three parts: a brief title, a general statement of knowledge and skills, and specific applications for illustrative purposes. The actual standards statement, which describes the knowledge and skills required, consists of a cognitive and behavioral component. This general statement is followed by one or more specific applications or content that serve to clarify the standard, but are not exhaustive.

An example of a standard from the health care core is as follows:

Safety Practices

All health care workers will be knowledgeable of potential hazards to the patient, co-workers, and self in performing their duties. They will take appropriate steps to prevent injury or illness through safe work practices and adherence to health and safety policies and procedures.

- Infection Control
- Body Mechanics
- Fire, Electrical, and Hazardous Materials
- Instrumentation and Protocols
- Emergency Medical Services and First Aid

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Prototype assessment tasks will be developed during Phase II of the project.

LABORERS-AGC EDUCATION & TRAINING FUND
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Date the Project Began: May 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The Laborers-AGC Industry Standards Program specifically addresses job tasks performed by Construction Craft Laborers in the heavy highway/utility construction and environmental remediation industry clusters.

The boundaries of heavy highway/utility construction laborers are identified in the Standard Industrial Classification (SIC) Major Group 16–. As stated in the SIC, "This major group includes general contractors primarily engaged in heavy construction other than building, such as highways and streets, bridges, sewers, railroads, irrigation projects,. . . ."

The environmental remediation boundaries, however, are not yet well-defined in the SIC as work is just beginning and will evolve over time. For the purposes of this project, the emphasis is on the job tasks performed by Construction Craft Laborers on projects involving the removal and disposal of hazardous materials such as asbestos, lead, petroleum products, radioactive material, and other chemical hazards.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

The project has defined the term *standard* to mean "a statement of a task, skill, or knowledge that contains activity, conditions, and performance criteria." It contains cognitive and behavioral components and will be expanded to include curriculum content.

Currently, tasks are being identified and validated; and standards have not been drafted yet.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

In Construction Craft Laborer work that requires governmental licensure or certification, some assessment instruments already exist. However, since most are built by academics or government officials who generated questions without job analysis and all are written tests where only knowledge is measured, the project is reexamining the issue.

We plan to identify criteria for and measure both skills and knowledge against the standard in the following ways: (1) through hands-on performance testing at a simulated job site during related training, (2) through performance monitoring by qualified journeyworkers and management on the job, and (3) through written tests.

In addition, the project plans to promote the standards to the industry and encourage voluntary adoption of a minimum craft certification. This minimum certification is defined as "a level of skill and/or knowledge attainment acceptable by an industry to represent demonstrated mastery that provides a quality product."

Council on Hotel, Restaurant, and Institutional Education
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Contact: Sally Conway
Date Project Began: December 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The hospitality and tourism industry as defined by the Council on Hotel, Restaurant, and Institutional Education (CHRIE) includes food services, lodging services, travel-related services, and recreation services.

All four segments of the industry have unique characteristics, but the common element among them is that they all provide *guest service*.

Skill standards will be developed for broad-based occupational clusters, which include the following:

Food services
Frequent guest contact positions, infrequent guest contact positions
Lodging services
Frequent guest contact positions, infrequent guest contact positions
Travel-related services
Frequent guest contact positions, infrequent guest contact positions
Recreation services
Frequent guest contact positions, infrequent guest contact positions

What definition of a standard are you using for your project? Please give an example of a standard for your project.

Skill standard: The identification of the knowledge, skill, and level of ability needed to satisfactorily perform a given task.

The following is an example of a skill standard for a front-desk attendant of a hotel.

Task: Verify a guest's credit.
Action: Must be able to verify guest credit in a timely, courteous manner and in compliance with the property's credit policies.

Knowledge:
1. Property procedure for establishing credit to secure room
2. Procedure for making credit card imprint
3. Credit card company policy for documenting authorization of credit

Skills:
1. Public speaking (one-to-one)
2. Arithmetic–multiplication level 1

Abilities:
1. Tolerance of interpersonal relationships
2. Deductive reasoning

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

This project will develop assessment and credentialing mechanisms during its second phase.

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Date Project Began: June 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The Human Service industry provides assistance to a broad range of people with diverse social and economic needs related to physical, emotional, or cognitive disabilities, as well as to individuals dealing with homelessness, substance abuse, domestic violence, or other temporary or chronic problems. Currently, there has been a shift in the delivery of these services from centralized institutions to community-based settings. As a result, community support systems have been developed that are designed to meet consumers' basic living needs and to promote access to a range of services to enhance the ability of people to both live in and participate in the community. This shift in the locus of service delivery away from institutions defines the context of the human service worker as the community environment.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

This project defines a standard as the number of component duties and tasks that community support workers are expected to perform at the entry level, as well as the knowledge and attitudes that they need to successfully perform these functions. Standards, which will be referred to as Integrated Skill Standards, will be performance-based and will be designed to integrate higher order cognitive competencies with real-life applications requiring demonstrated mastery. This project will develop skill standards by analyzing tasks found in a range of human service occupations across a variety of employers and work settings. This work will include developing a master list of commonly shared tasks, analyzing the competencies required, and attaching outcome criteria, using a Developing a Curriculum analysis (DACUM). Such an analysis operates on the premise that expert workers can describe/define their jobs better than anyone else, that any job can effectively and sufficiently be described in terms of the tasks, and that all tasks have direct implications for the knowledge and attitudes that workers must possess in order to perform these tasks successfully.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

The project will develop performance criteria in a workshop that will be held in the second phase of the project. It is expected that these criteria will be assessed using a multi-model approach that incorporates pencil-and-paper tests, problem solving with case vignettes, supervisor reports, portfolios, and direct observation in work-based situations. Project activities in the second phase will focus upon the development of a nationally recognized certification system as well as the creation of model curricula and other supports for educators.

UNIFORM AND TEXTILE SERVICE ASSOCIATION
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Date Project Began: December 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The Industrial Laundry Industry is defined by Standard Industrial Classification (SIC) 7218. Industrial Launderers meet the needs of business, industry, and government by providing clean textile products that include work uniforms, mats, shop (wiping) towels, and dust mops. These products are owned by industrial launderers and are leased to customers. They are picked up at customers' places of business, brought to a plant where they are laundered or cleaned, and returned to customers on a cyclical basis. SIC 7218 is a $3 billion industry which operates more than 1,300 industrial laundry plants throughout the United States. It employs about 53,000 people, of whom about 65 percent are low-skilled workers at the bottom end of the wage scale.

SIC 7218 defines the industry as stated above. However, the industrial laundry industry is only one segment of the much larger Laundry, Cleaning, and Garment Services group (Industry Group No. 721), which includes Commercial and Power Laundries, Linen Supply, and Dry-Cleaning Plants. The 721-industry group includes 51,000 establishments having revenues in excess of $13 billion and employing more than 400,000 people.

The management plan for the option year of the project envisions extending the project to cover other segments of the 721-industry group.

From the outset, the project identified two occupational groups for which industry skill standards will be set: *production workers* and *maintenance technicians*. These occupational groups include the majority of nonbaccalaureate workers in the industry.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

An industry standard is a comprehensive statement of the way skills and knowledge must be integrated to demonstrate mastery of core work responsibilities for an occupational group. These core job responsibilities involve the performance of tasks in which workers demonstrate that they can integrate and apply basic foundation skills and workplace competencies. These responsibilities include entry-level (fundamental) skills as well as higher level skills, using more complex abilities on higher skilled work assignments.

Although draft skill standards have been developed for both occupational groups, skill blocks have not yet been identified. Consequently, examples of standards cannot be provided.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Both knowledge assessment tests and skills performance checks (hands-on checks) will be used to assess performance against standards. A two-level certification system is being developed, based on a portfolio approach, which will include the knowledge assessment tests and skills performance checks.

NATIONAL TOOLING AND MACHINING ASSOCIATION
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Contact: William E. Ruxton, Vice President
Date Project Began: December 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

Workers in these skill groups are also employed in toolrooms and support shops of virtually all manufacturing industries, and in shipbuilding, aircraft maintenance and repair, and research and development facilities.

Because of the wide array of industries that employ skilled metalworkers, the National Tooling and Machining Association (NTMA) has not attempted to sharply delineate industry boundaries.

The draft standards have been organized according to functional occupational clusters. Cluster titles have been selected with the deliberate intent of avoiding commonly used job titles that are frequently applied inconsistently among different employers. The four clusters include the following:

Machining Technician ("Machinists," and so on)
Tooling Technician (Tool and die makers," and so on)
Industrial Equipment Technician ("Machine builders," and so on)
Metalforming Technician ("Precision Fabricators," and so on)

Additionally, three competency levels are proposed for each cluster.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

Draft standards under this project are defined as including a Duty component and components of Knowledge, Skills, and Attitude (KSA). Duty standards represent the most important duties or responsibilities that workers are expected to perform at a given competency level. These standards are to be assessed through application in written and oral examinations, and performance examinations, or actual workplace performance. In order to be used for certification purposes, the standards must specify mastery performance under specified conditions, given specific quality and time requirements.

An example of the draft standards for Machining Technician-I follows (see next page):

NATIONAL TOOLING AND MACHINING ASSOCIATION
(continued)

Duty Area: 2 **Job Execution**
Duty: 2.5 **Power Feed Milling**

Set up and operate a horizontal or vertical milling machine using power feeds. Perform routine milling.

Mastery performance: Given raw material, process plan, blueprint, hand, precision, and cutting tools, as well as access to an appropriate milling machine and its accessories, produce a part matching the process plan and the blueprint specifications. The part specified should require squaring up from the raw state, and should require significant material removal. Depth of cuts between .200" and .250" will be required.

Accuracy level: +/- .015 on all fractions, +/- .005 on all decimals unless otherwise specified on the blueprint. Surfaces square to within +/- .005" over 4".

Assessment Equipment and Material:

Workstation: A standard workbench, a mill with power feed on the X and Y axes. Table capacity of approximately 12" X 36". Forty taper spindle or greater preferred.

Material: A part matching the material requirements of the power feed milling blueprint, material: 1018 HRS.

Tooling: A 6" milling vise or greater, screws, studs, nuts, washers, and clamps sufficient to secure the vise, or the part to the table. Assorted parallels, ball peen, and composition hammers, assorted cutters and cutter adapters fitted to the machine spingle, files, magnetic base for indicators, soft jaws for the vise.

Measuring Instruments: Required micrometers, combination set, dial indicator, 6" rule, a 6" vernier, dial, or electronic caliper, adjustable parallels, edge finder, and Garr plates.

Reference: Machinery's Handbook.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Performance against the standards will be assessed as described above, on a task-by-task basis. Thus, it will be possible to achieve certification incrementally over a period of time. This approach has been compared with the "merit badge" system used in Scouting, where advancement hinges on a series of discrete achievements. Under the NTMA project, the Council of Great Lakes Governors has the State Quality Workforce Network to assure uniform assessment and certification systems among the states, as well as recognition of certification across state lines.

CORD
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Date Project Began: May 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The photonics industry includes businesses engaged in the generation, manipulation, transport, detection, and use of light information and/or light energy when light is defined as electromagnetic radiation from the far infrared to the x-ray region.

This definition was created at a meeting held on August 26, 1993 in Albuquerque, New Mexico, which was called "Photonics 2000." A report of the meeting is available from CORD.

The project has identified nine specialty areas of photonics technicians, which include the following: defense public safety aerospace, communications, medical, environmental, hard copy, transportation, manufacturing, entertainment/consumer devices, and computers.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

A standard is a "norm" recognized as authoritative by a majority of those in the industry. Standards are either regulatory or voluntary. For the purposes of this project, voluntary standards have been chosen. To become a voluntary standard, a document must be designed by a consensus of leading experts within the industry. Committees, formed by appointed chairmen recognized as experts in their field, assemble and disseminate a document throughout the industry. The success of a standard greatly depends on the diversity and volume of the industry represented in the process.

Voluntary standards are common in the photonics industry. The most prominent of these voluntary standards is the ANSI Z136.1 Standard for the Safe Use of Lasers, which is widely accepted throughout the industry as the norm when it comes to safety with lasers. It is hoped that the photonics skill standard will become an accepted norm.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

This project is looking to industry for answers to this question. Meetings have been scheduled with the industry constituents to debate this idea. So far, a number of questions have been raised including the following:

1. Should performance against this standard be measured?
2. If so, how?
3. Would certification be beneficial to this industry?
4. If so, who would be the certifying organization?
5. What legal issues would the certifying organization need to consider?

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Date Project Began: November 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The National Printing Skills and Knowledge Standards Project has defined the printing industry as those firms engaged primarily in commercial printing, business forms, book printing, bookbinding, printing trade services, engraving, and platemaking. The project has organized the industry into three technical occupational clusters—**Prepress**, **Press**, and **Postpress**. Each cluster includes a group of related jobs and each cluster relates to a process in the sequence of creating a printed product. Within each occupational cluster, the project has defined a number of functional areas that can be combined to define a specific job. The functional approach provides the flexibility needed by the industry in defining job standards given the diversity in firm size, complexity of processes, size of press, and other variables that impact how jobs are defined. In addition to standards specific to each occupational cluster, the project is identifying a core of broad standards necessary for all workers in the printing industry.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

The project has defined a standard as having two components—the breadth of knowledge and skills needed to perform a job (competency) and the level of proficiency needed to demonstrate mastery of the necessary knowledge and skills (performance level). The project Steering Committee has identified the expert level as the level at which the standards will be set.

An example of a standard from the Press occupational cluster:

Ink Additives

The common lead-in phrase preceding all competency and performance-level statements is "The expert press operator should be able to . . . ."

Competency: Understand the purpose of ink additives and be able to use appropriately.

Performance Level: Is able to list ink additives and their properties and is able to use ink additives appropriately as job requires; is able to solve problems with additives as they develop.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Much of the project's Phase II activity will be devoted to developing appropriate assessment instruments and procedures and creating a certification system.

National Retail Federation
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Date Project Began: December 1992

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The project addresses the needs of the National Retail Federation's member companies, as well as the entire retail industry. Standards will apply to Professional Sales Associates in all types of retail companies, regardless of size, location, or merchandise. The initial focus is at the point of sale, where retailers interact directly with customers.

A working definition of high-performance retail employers and employees emphasizes retailers recognized for excellence in sales and services and their commitment to empowering their employees and increasing performance and skills. Ultimately, job skill standards will help retailers build a more committed, high-performing workforce.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

Simply stated, job skill standards reflect what an employee needs to do and to know to perform well on the job. Key to setting a standard is identifying and integrating knowledge, skills, and abilities with tasks.

Task statements have been validated. A sample task statement is as follows:

Determine customer's needs by listening and asking questions.

Standards are currently being formatted for release.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Assessment will be addressed in the later phases of the project. However, it is intended to profile overall worker qualifications and demonstrated skills. Techniques for assessing, documenting, and profiling skills are being explored, with an emphasis on experiential learning, skill development, and work-based learning.

American Welding Society
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Contact: Nelson Wall (Charles Fassinger)
Date Project Began: July 1993

What is the definition of industry for your project? What criteria did you use to define the boundaries of your industry? What approach are you using to organize your industry in order to set standards?

The welding industry is described as any employment environment where the tasks associated with welding contribute, in part, to the manufacture, fabrication, construction, or repair of that institution's completed product or assignment. These employment environs and training institutions are divided into three categories: Type of Business, Job Classification, and Industrial or Educational Area. Within each category, a number of subcategories exist. For example, "Petroleum Industry, Manager, Union Shop." In the example, the first title indicates the type of business, the second describes the job classification, and the third the industrial or educational area.

What definition of a standard are you using for your project? Please give an example of a standard for your project.

The definition of a standard is "a generic term incorporating codes, specifications, recommended practices, classifications, methods, and guides that have been prepared by a sponsoring committee, and approved and adopted by the American National Standards Institute (ANSI)."

The current standard for this project is limited to the job classification of Entry-Level Welder, which is described as a semi-skilled, non-code production welder job requiring significant supervision. The entry-level welder will possess the prerequisite knowledge, attitudes, skills, and habits (KASH) required of all welders regardless of their specific area of industry or geography.

How will performance against the standards be assessed (i.e., assessment instruments, certification systems)?

Performance evaluation will be based upon welder qualification testing for each welding process. In addition, paper-and-pencil tests will measure the entry-level welder's comprehension of welding-related knowledge and skills. The individuals who become qualified will be certified, and that certification will be entered into and maintained in a National Registry.